



# **Armed Forces College of Medicine**

## **AFCM**



# Elbow & Radio-ulnar joints

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# INTENDED LEARNING OBJECTIVES (ILO)



**By the end of this lecture the student will be able to:**

- 1) Describe type, articular surfaces, fibrous capsule, synovial membrane, ligaments, movements, arterial and nerve supply of elbow joint.
- 2) Describe type, articular surfaces, fibrous capsule, ligaments and movements of radioulnar joints.



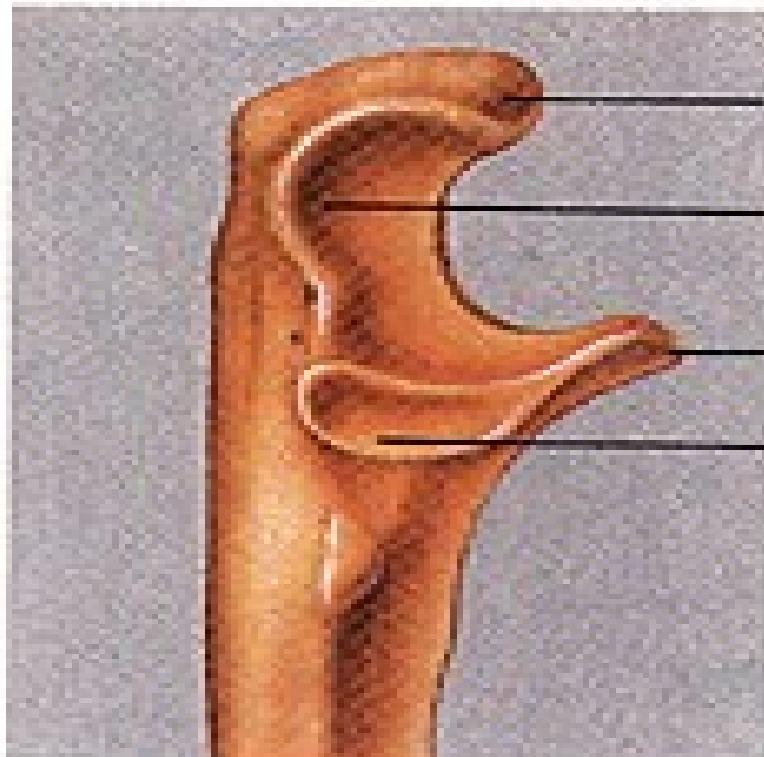
# Lecture Plan

- Part 1 (20 min): Elbow joint.
- Part 2 (20 min): Radio-ulnar joints.
- Summary (5 min)

# Revision of the bones involved



**Upper end of ulna  
(Lat. View)**



Olecranon process  
Trochlear notch  
Coronoid process  
Radial notch

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**Bones of Elbow in Extension  
Anterior and Posterior Views**



**Ant. View**



**Post. View**

Frank H. Netter, 4<sup>th</sup> ed.

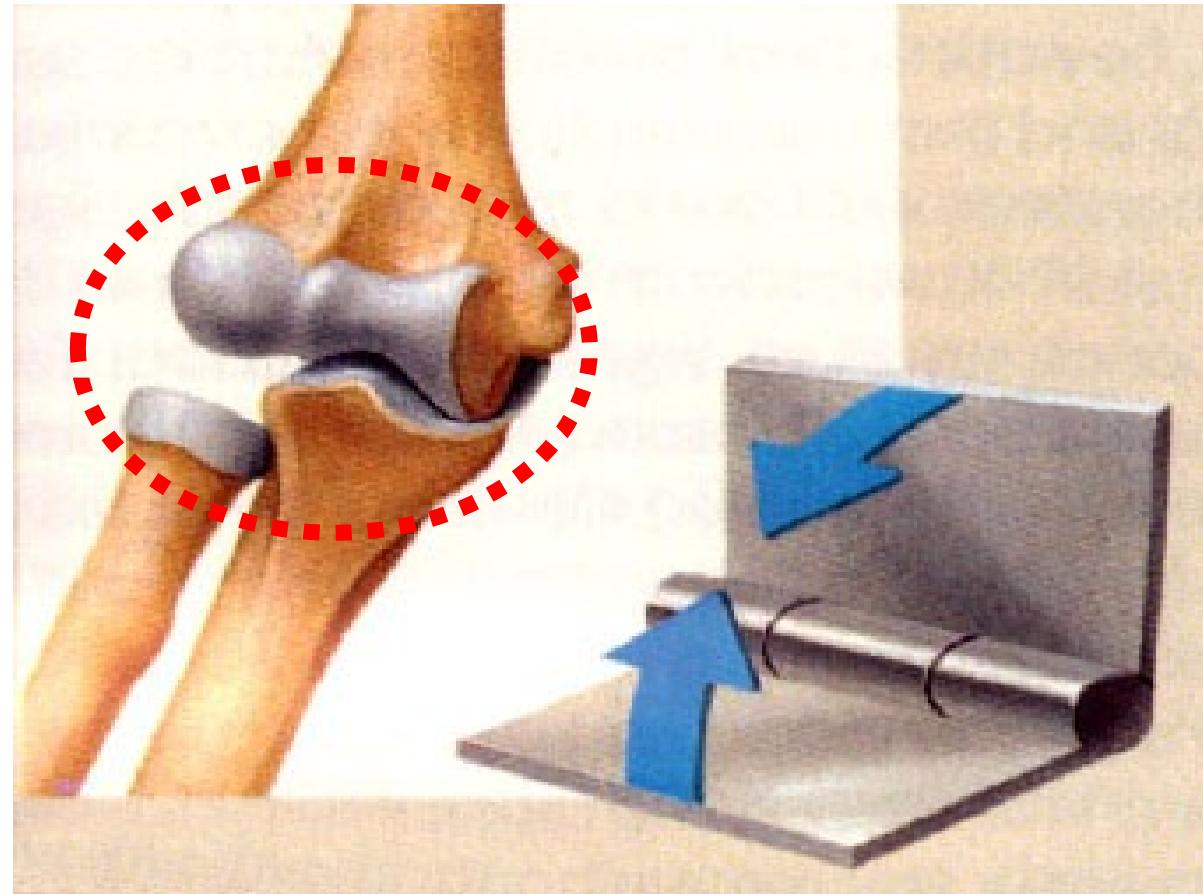
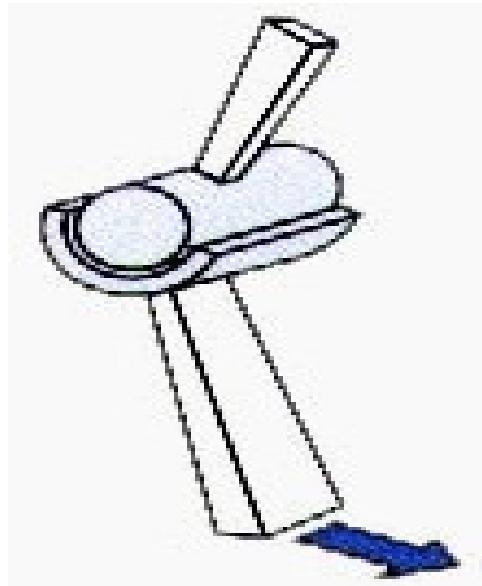
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# **ELBOW JOINT**



# I. Type

- **Type:**  
**Synovial-hinge joint**

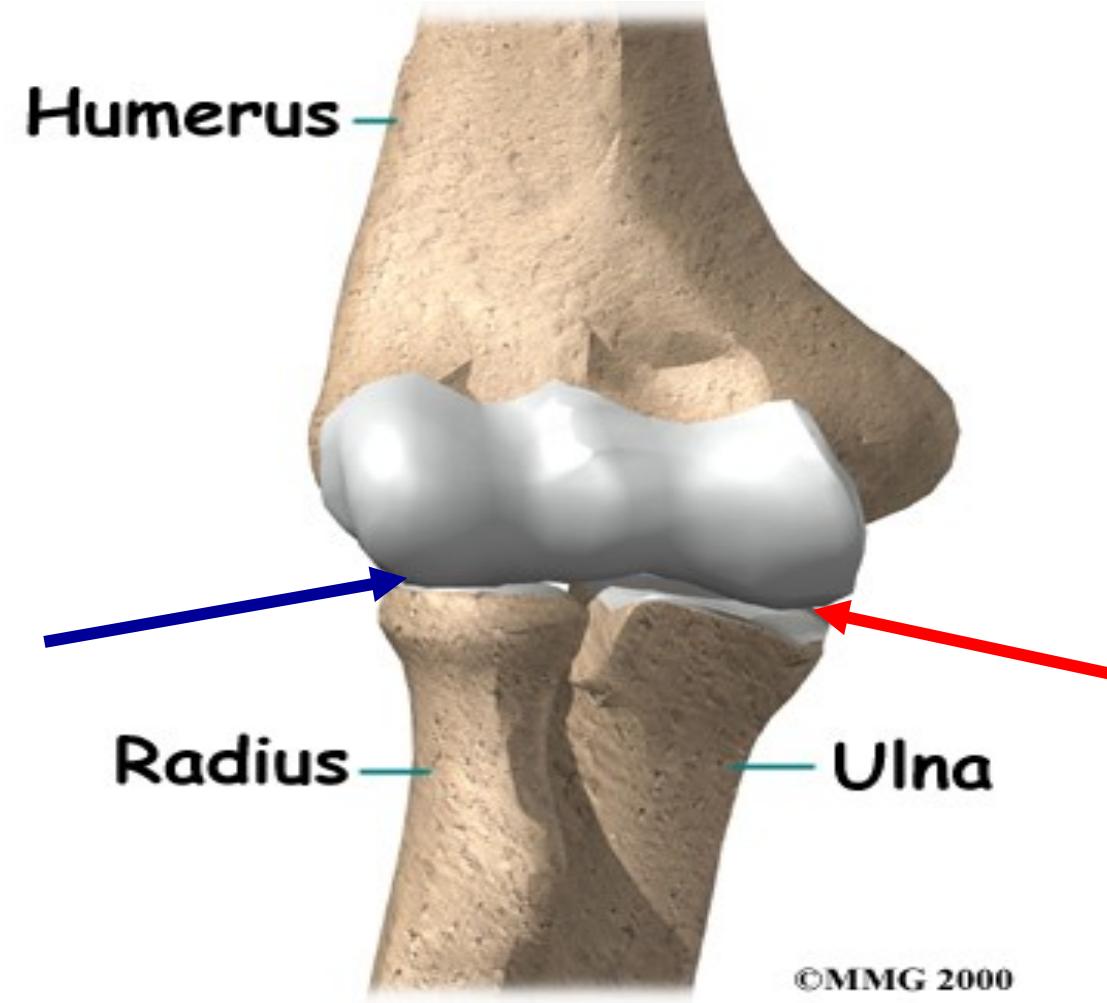


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## II. Articular surfaces:



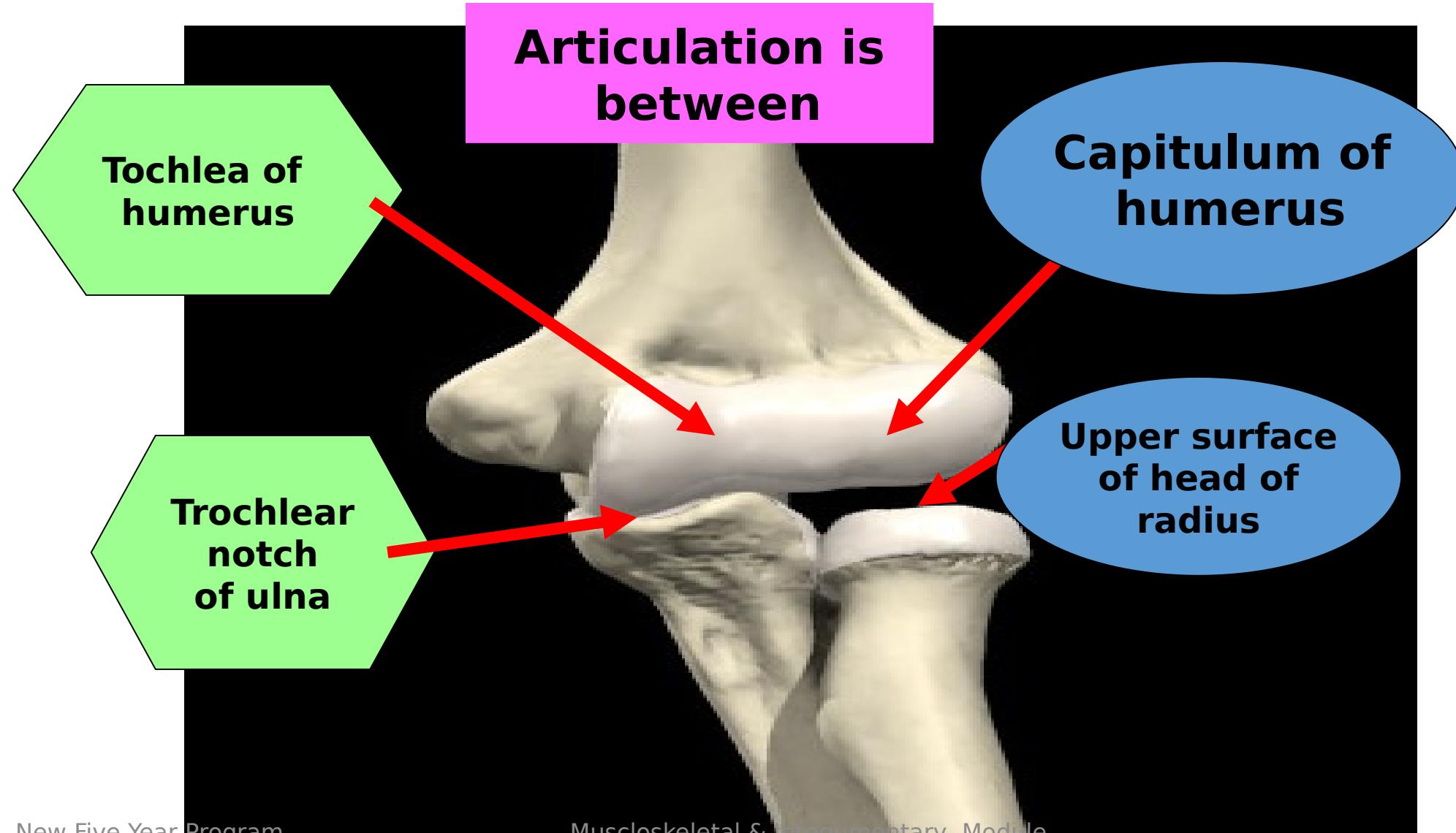
- 1- Humero-ulnar articulation**
- 2- Humero-radial articulation**



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## II. Articular surfaces:





# III. Capsule:

- Surrounds articulating surfaces

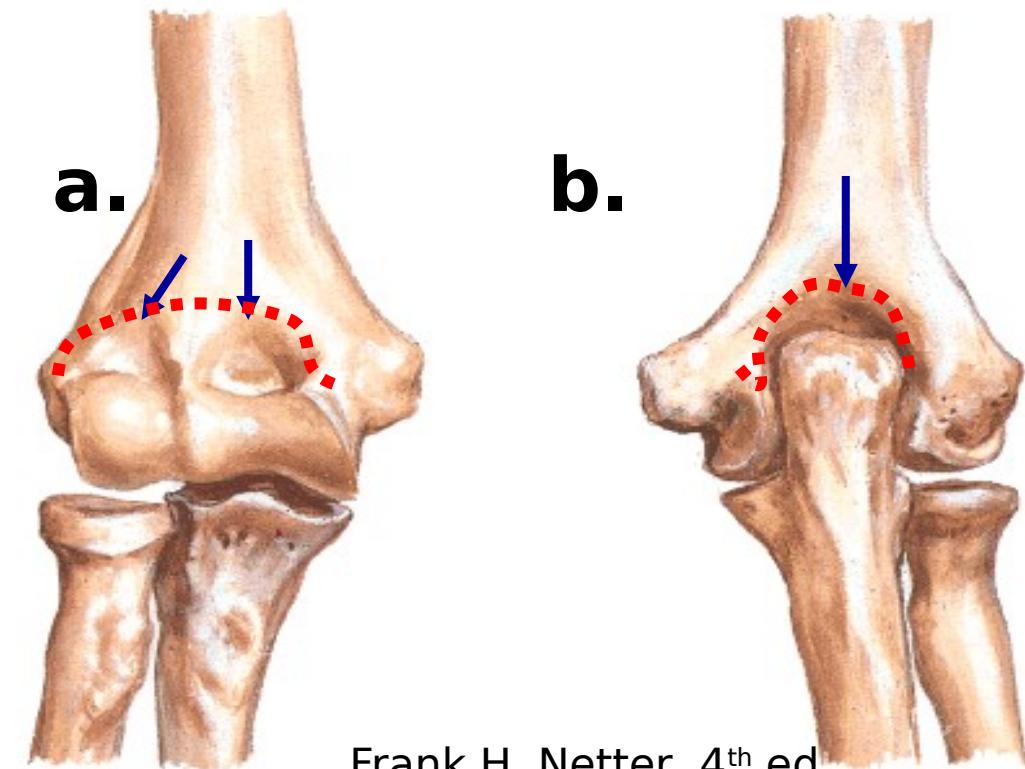
## 1) Superiorly ☐

a. Front of humerus above coronoid & radial fossae.

b. Back of humerus above olecranon fossa.

- i.e. the 3 fossae are intracapsular

Bones of Elbow in Extension  
Anterior and Posterior Views



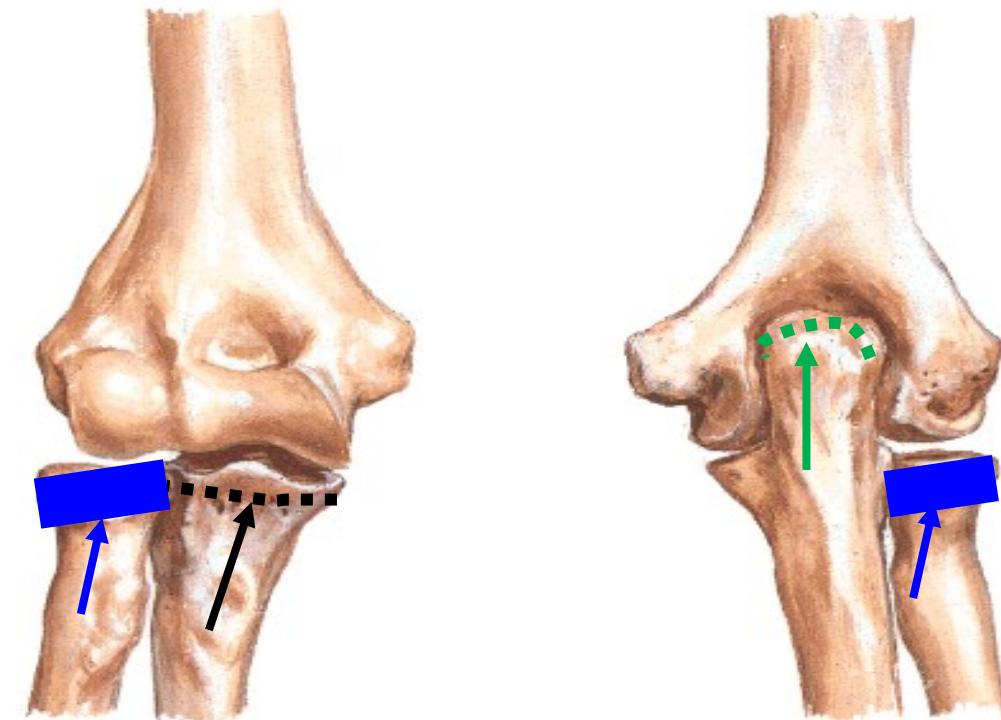
Frank H. Netter, 4<sup>th</sup> ed.



### III. Capsule:

**2) Inferiorly □ to margins of coronoid & olecranon processes & to annular ligament (surrounding head of radius)**

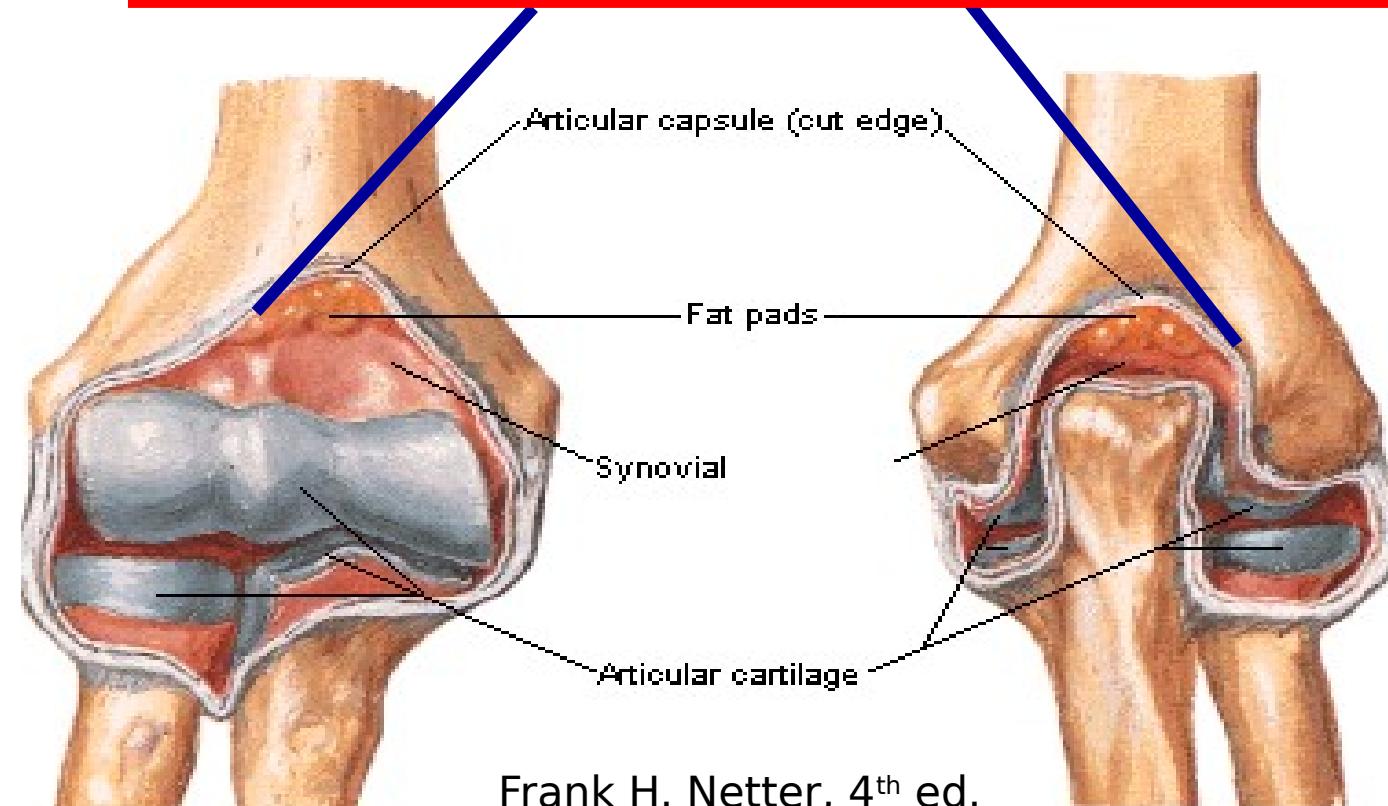
**Bones of Elbow in Extension**  
Anterior and Posterior Views



Frank H. Netter, 4<sup>th</sup> ed.

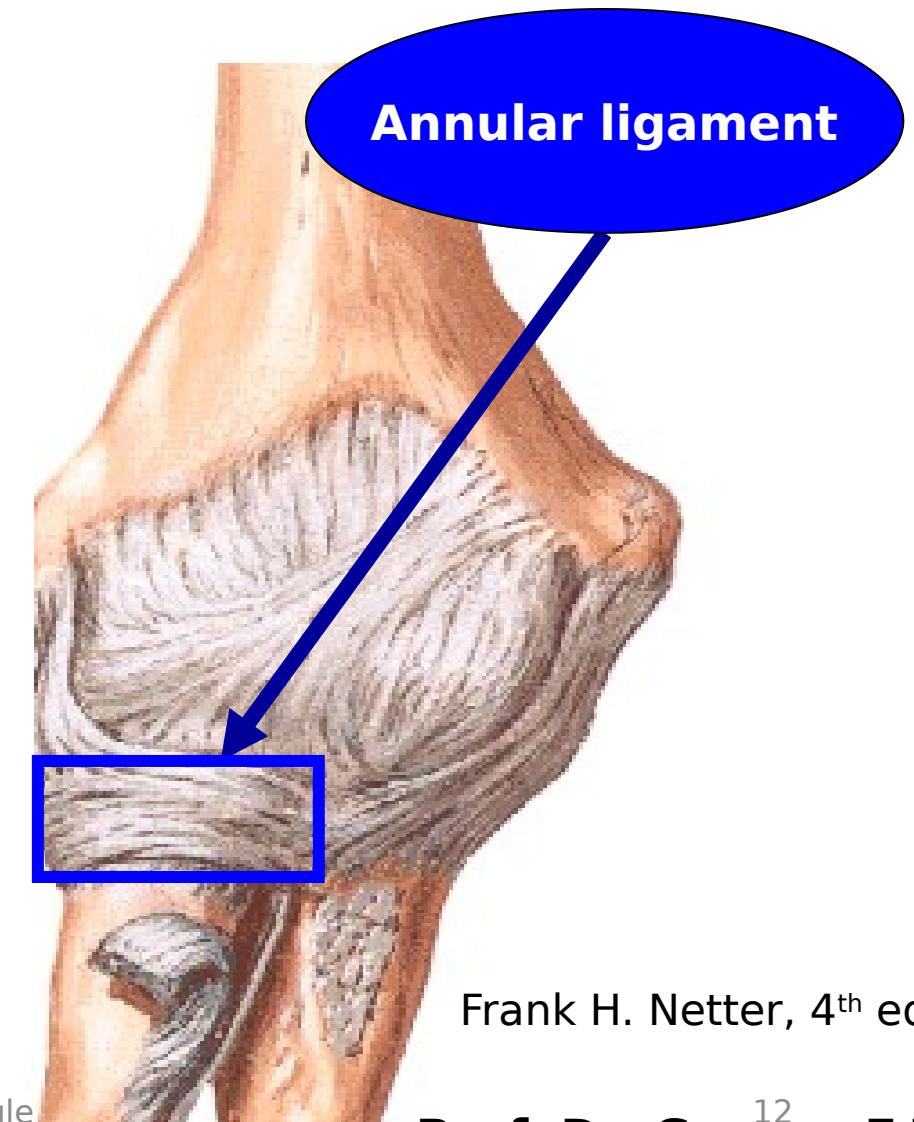
## Elbow Joint [Opened] Anterior and Posterior Views

**Line of attachment  
of articular capsule**



Frank H. Netter, 4<sup>th</sup> ed.

## Ligaments of Elbow Lt Elbow - Anterior View



Frank H. Netter, 4<sup>th</sup> ed.



# IV. Ligaments:

## Med. view



Frank H. Netter, 4<sup>th</sup> ed.

### **1- Med. (Ulnar collateral) ligament:**

@ Triangular in shape formed of **3 bands** connecting **3 bony features**:

- a. Tip of med. epicondyle of humerus.
- b. Med. aspect of coronoid process of ulna.
- c. Med. aspect of olecranon process of ulna.

**@ These 3 bands are:**

a. **Ant. Band:** between tip of med. epicondyle of humerus & med. aspect of coronoid process of ulna.

b. **Post. band:** between tip of med. epicondyle of humerus & med. aspect of olecranon process of ulna.

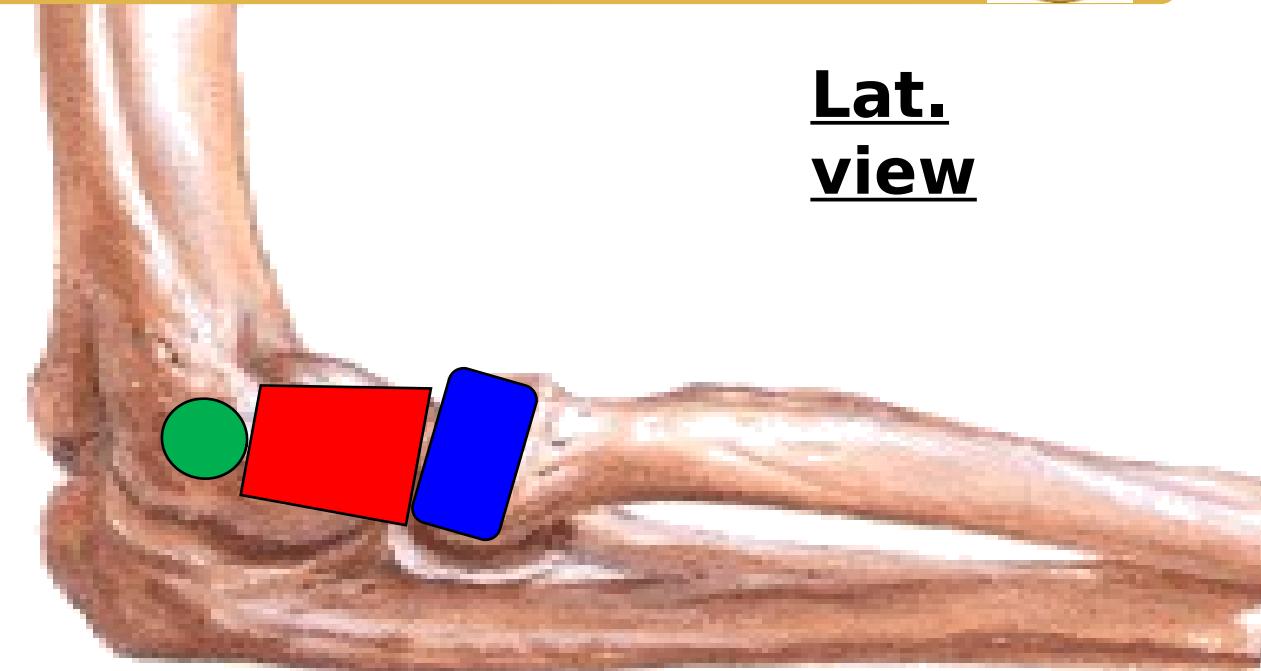


## IV. Ligaments:

### 2- Lat. (Radial collateral) ligament: Δ

- Connects lateral epicondyle of humerus to upper border of annular ligament (surrounding head of radius)

Lat.  
view

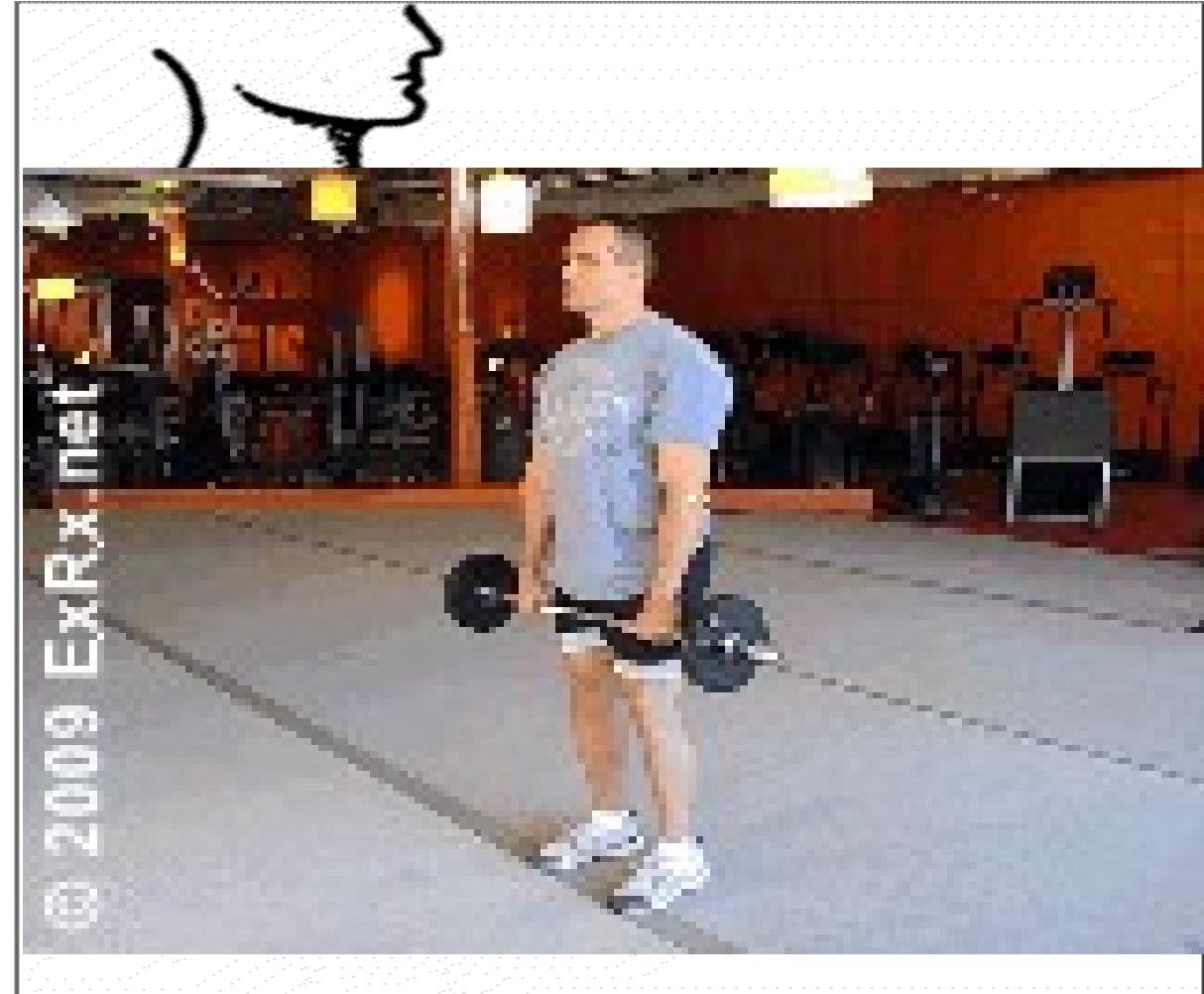


Frank H. Netter, 4<sup>th</sup> ed.



## V. Movements:

- **Uniaxial joint which permits flexion & extension only**





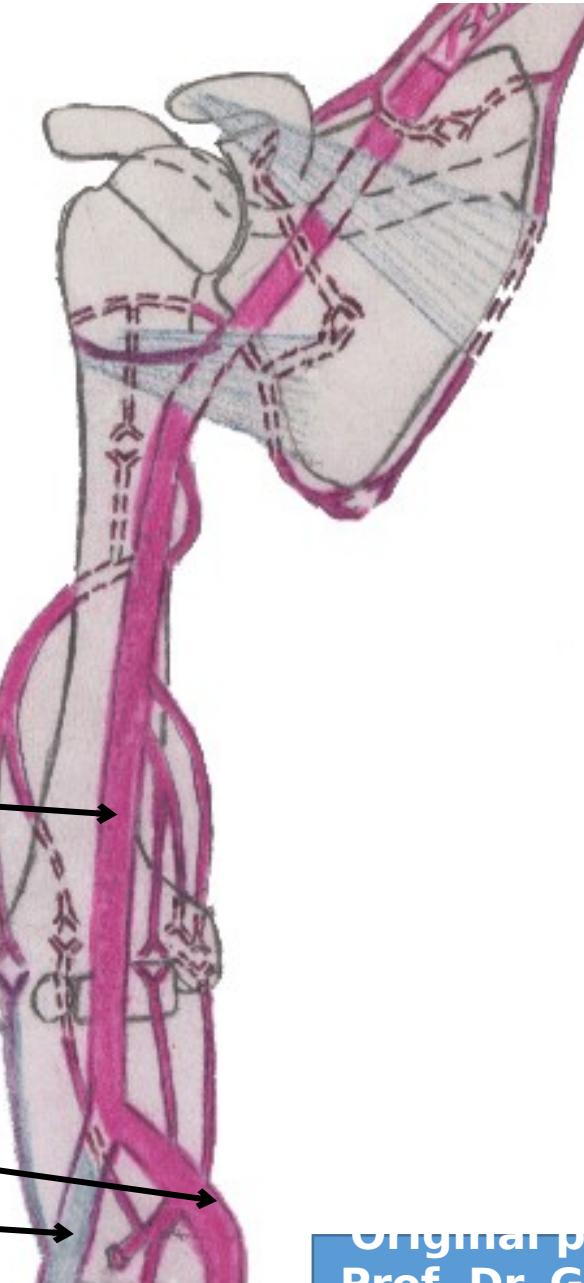
**Pronation & supination take place  
in the **radioulnar joints****

**NOT IN THE ELBOW JOINT**

# VI. Arterial supply:



- **Anastomosis around elbow by branches from:**
  1. Brachial A.
  2. Profunda brachii A.
  3. Ulnar A.
  4. Radial A.

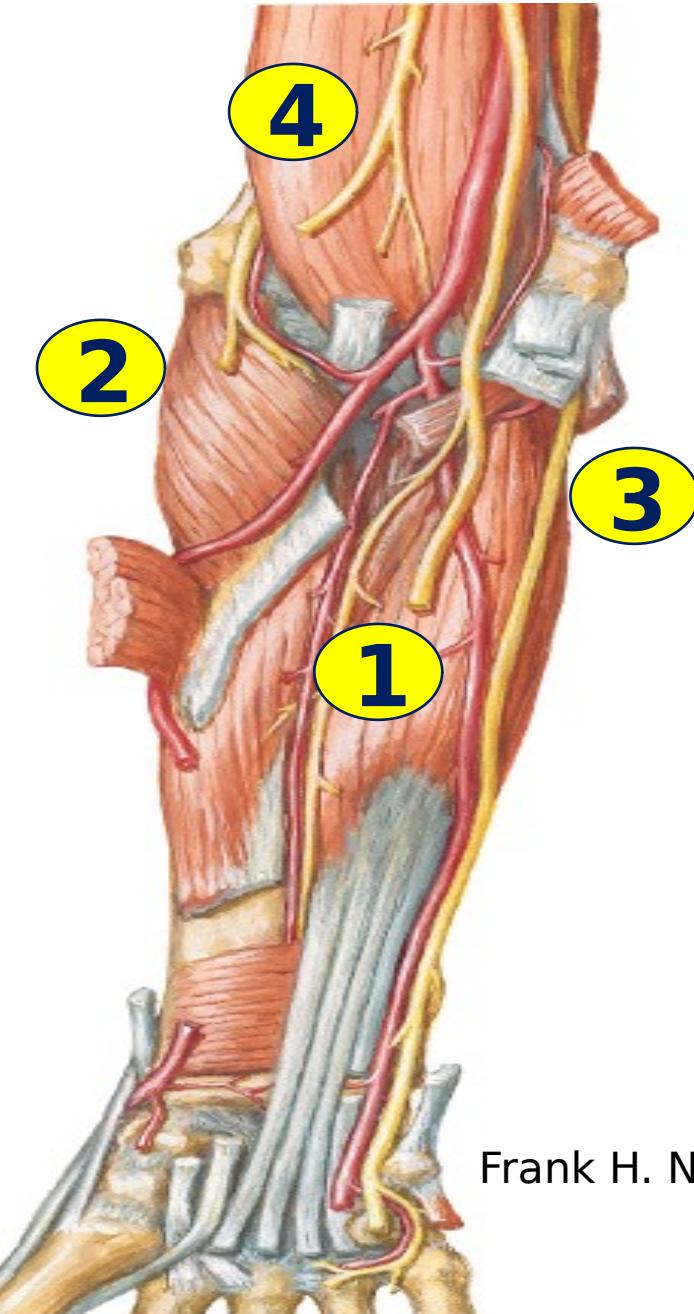


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## VII. Nerve supply:



- By branches from:
  1. Median nerve
  2. Radial nerve
  3. Ulnar nerve
  4. Musculo-cutaneous nerve



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## VIII. Clinically applied points: In normal elbow



- 1) **In extension**, the medial and lateral humeral epicondyles and the olecranon process of ulna are in **a straight line**.
- 2) **In flexion**, the bony points form the boundaries of **a triangle**.



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# VIII. Clinically applied points:

## 1) In elbow dislocation



- This arrangement is disrupted.



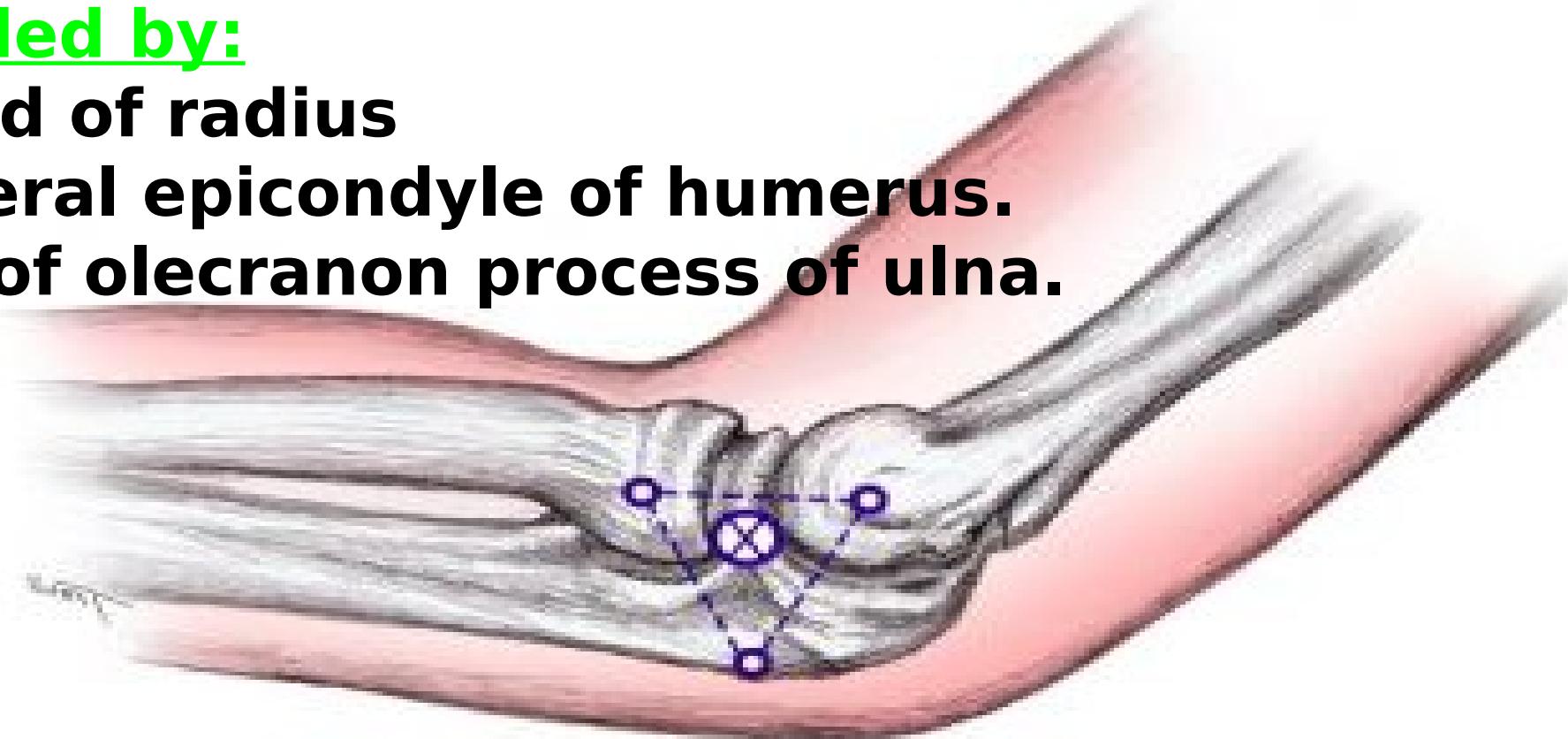
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## VIII. Clinically applied points: 2) Arthrocentesis of elbow



**Introduce the needle in the center of the triangle bounded by:**

- a) Head of radius
- b) Lateral epicondyle of humerus.
- c) Tip of olecranon process of ulna.



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# Lecture Quiz



**After a severe fall on the elbow, a 5-years-old male child experienced severe pain in his right elbow. The orthopedic specialist diagnosed an avulsed (torn) medial collateral ligament. Which of the following structures might be affected as well?**

- A. Medial epicondyle of humerus.**
- B. Lateral epicondyle of humerus.**
- C. Lateral aspect of coronoid process of ulna.**
- D. Superior aspect of olecranon process of ulna.**

# Lecture Quiz Answer



**After a severe fall on the elbow, a 5-years-old male child experienced severe pain in his right elbow. The orthopedic specialist diagnosed an avulsed (torn) medial collateral ligament. Which of the following structures might be affected as well?**

- A. Medial epicondyle of humerus.**
- B. Lateral epicondyle of humerus.**
- C. Lateral aspect of coronoid process of ulna.**
- D. Superior aspect of olecranon process of ulna.**

# Relax, if you can



# *Radio-ulnar joints*



### 3 Radio=ulnar joints

- 1) Superior (synovial- pivot).**
- 2) Middle = Interosseous membrane (fibrous)**
- 3) Inferior (synovial- pivot).**

# 1) Sup. Radio-ulnar Joint (synovial- pivot)



Articular surfaces

**Radial  
collateral lig.**

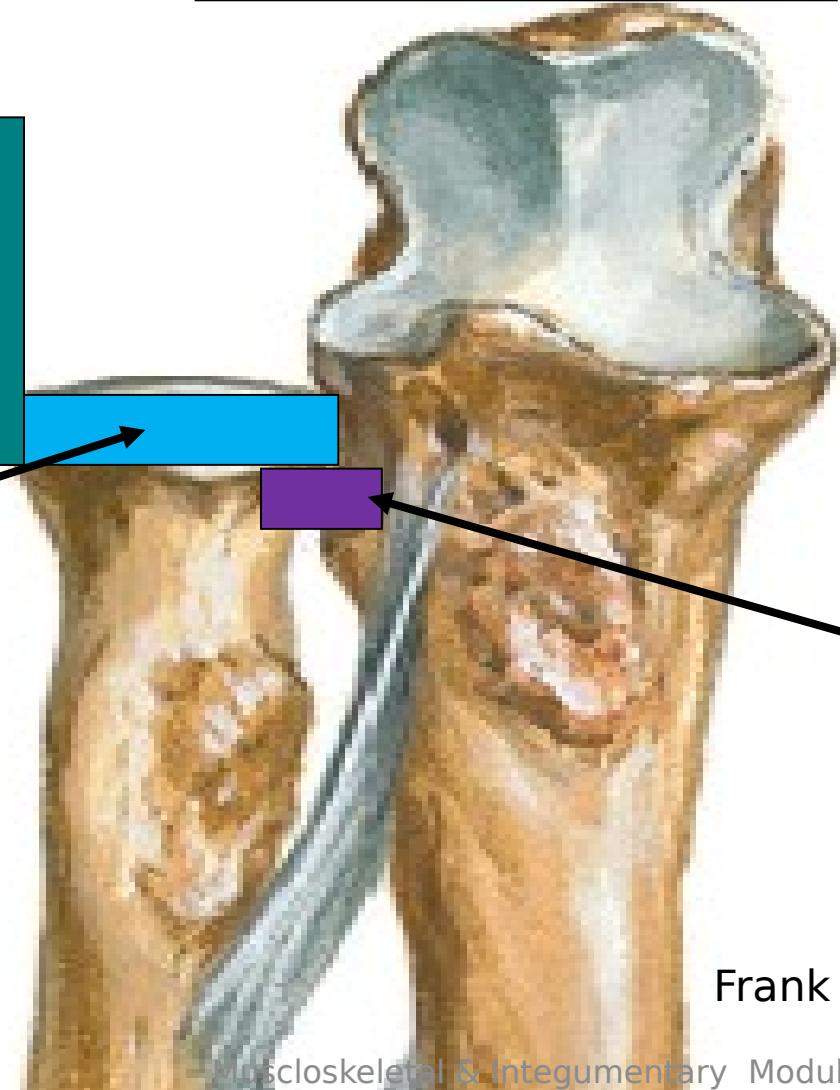
**Head of radius**

**Annular lig.**

**Radial notch of  
ulna**

**Quadratus lig.**

**(bet. neck of  
radius & ulna  
below radial  
notch)**



Frank H. Netter, 4<sup>th</sup> ed.

# 1) Sup. Radio-ulnar Joint (synovial- pivot)



@ Type: Synovial- pivot.

@ Articular surfaces:

1- Circumference of head of radius.

2- Radial notch of ulna.

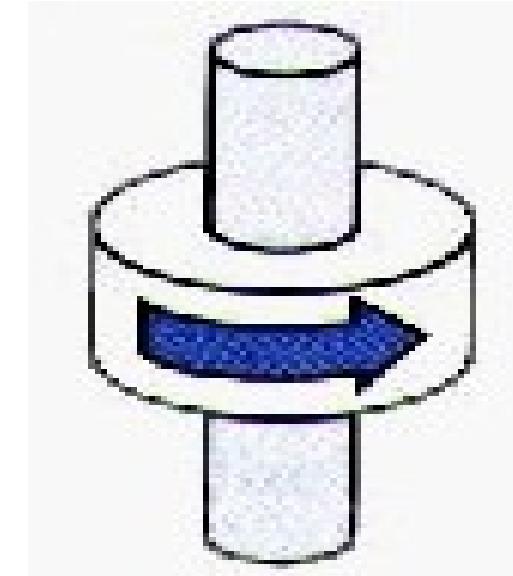
@ Ligs.:

1- Annular lig. ??

2- Quadrature lig. (bet. neck of radius & ulna below radial notch) closes the J. from below.

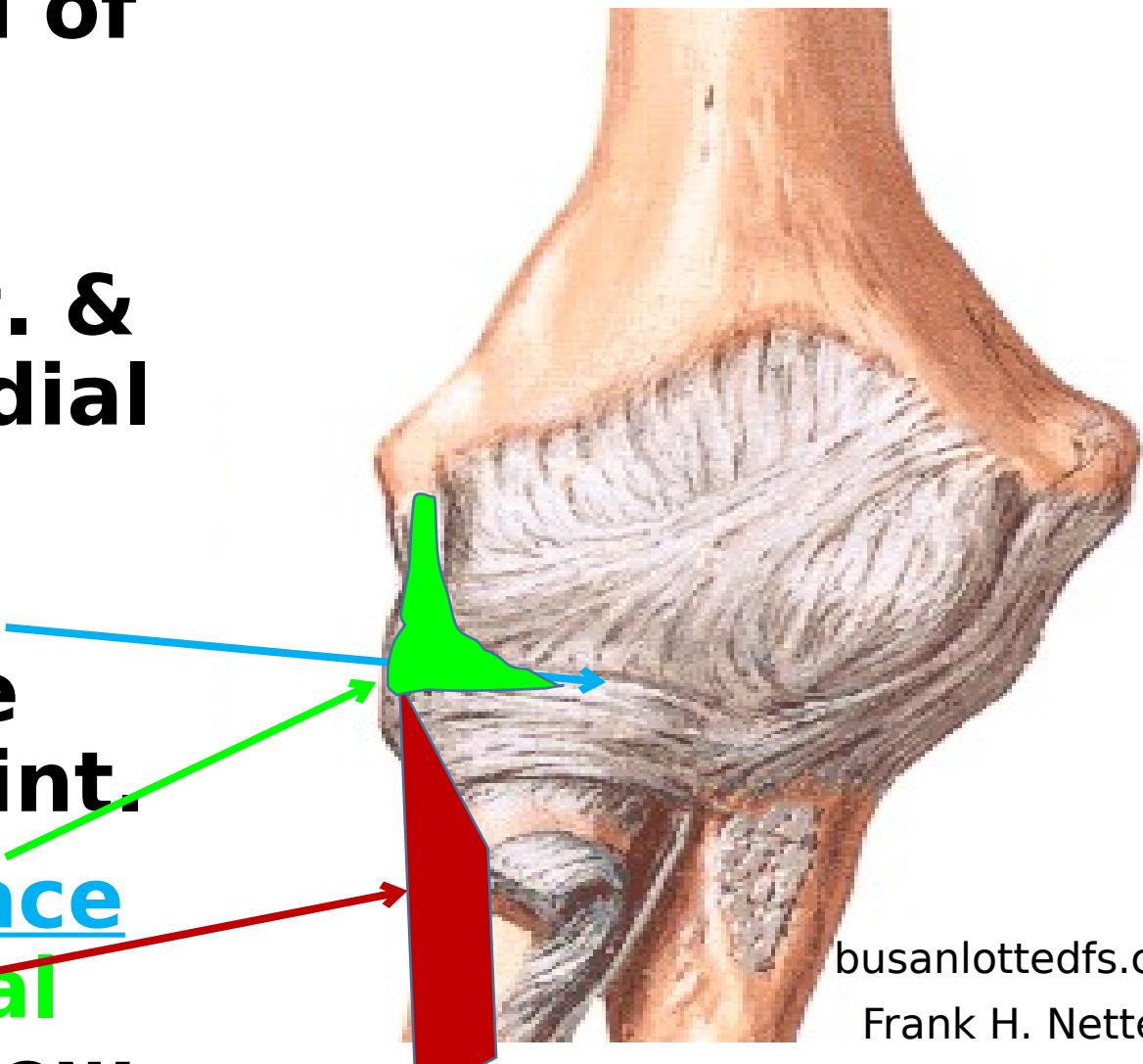
@ Movements:

Pronation & supination ??.



# Annular ligament

- Surrounds the head of radius & keeps it in position.
- Attached to the ant. & post. margins of radial notch of ulna.
- Its upper border is continuous with the capsule of elbow joint.
- Its outer (lat.) surface gives origin to ~~radial~~ collateral lig. of elbow



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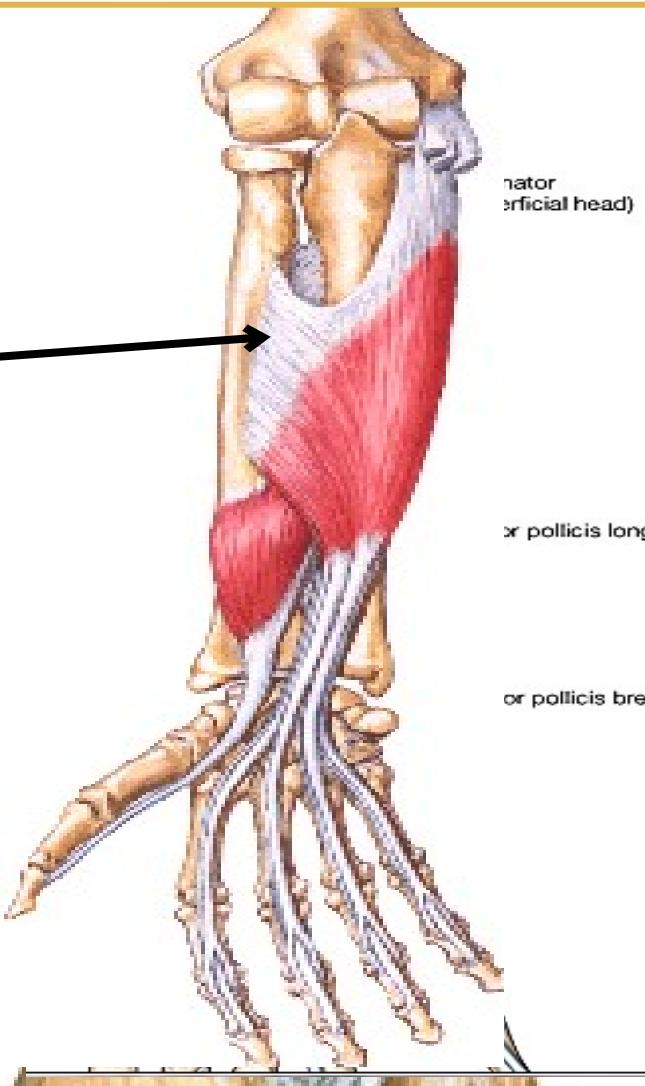
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## 2) Middle Radio-ulnar Joint = Interosseous membrane



(fibrous joint)

Gives additional origin for  
**Deep flexors**  
& **Deep extensors**  
of the forearm



— Gap for post.  
interosseous  
A. to pass  
post.

Interosseous  
border

Directed down &  
med. (from  
radius to ulna)

— Gap for ant.  
interosseous  
A. to pass  
post

Elsevier. Drake et al: Gray's  
anatomy for student - www.  
studentconsult.com  
.Frank H. Netter, 4<sup>th</sup> ed

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## 2) Middle Radio-ulnar Joint = Interosseous membrane



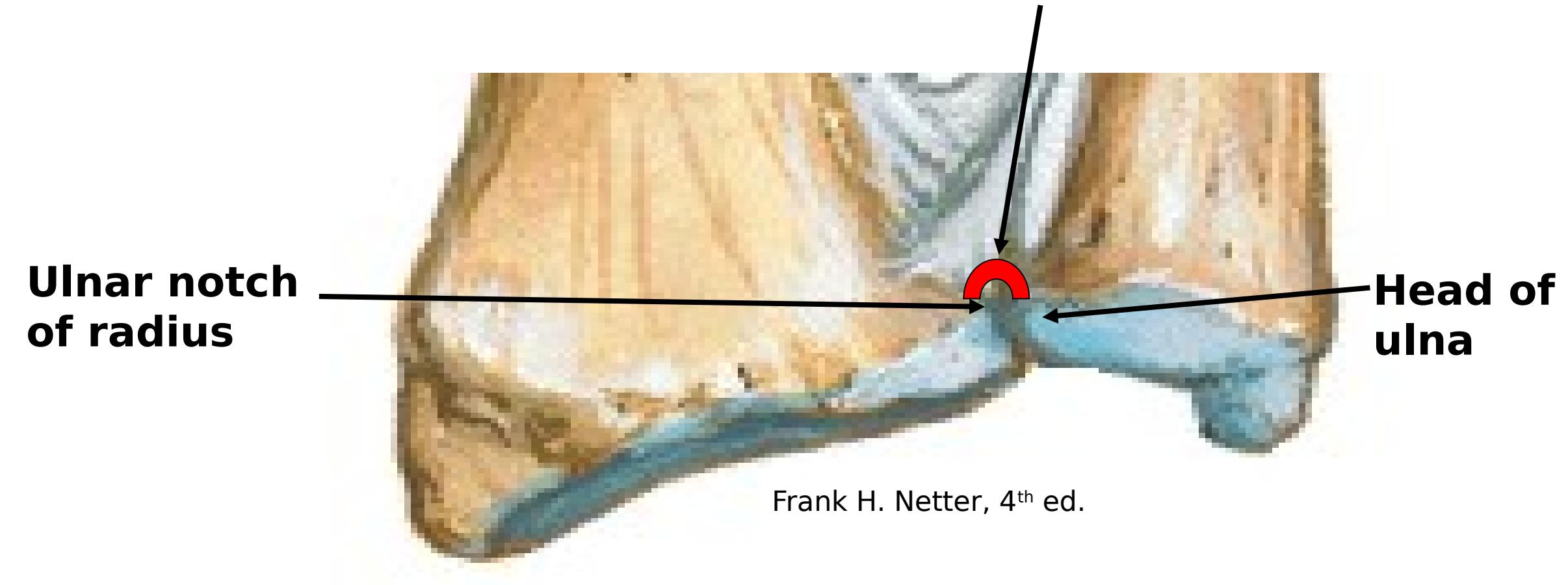
(fibrous joint)

- **It is a fibrous membrane connecting the interosseous borders of radius & ulna (*beginning 1 inch below radial tuberosity*).**
- **Its fibers are directed down & med. (from radius to ulna) → transmission of shocks from the hand to radius & then to ulna.**
- **It gives additional origin to the deep flexors & extensors of forearm.**
- **It presents 2 gaps:**
  - 1) An upper one (for the passage of posterior interosseous A. to the back of forearm).
  - 2) A lower one (for the passage of anterior interosseous A. to the back of wrist joint).

### **3) Inf. Radio-ulnar Joint (synovial- pivot)**



**Recessus Sacciformis**



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### **3) Inf. Radio-ulnar Joint (synovial- pivot)**



**@ Type:** Synovial- pivot.

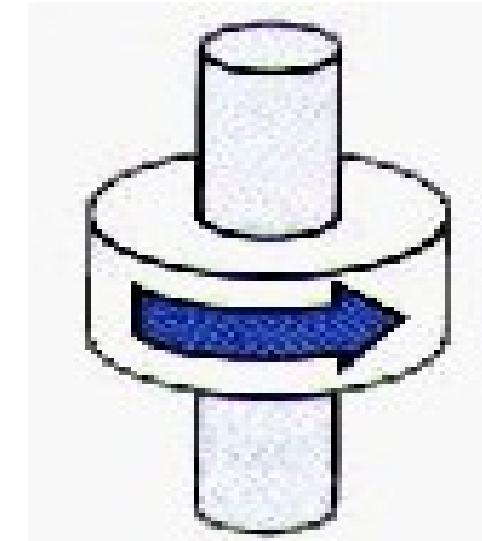
**@ Articular surfaces:**

1- Head of ulna.

2- Ulnar notch of radius.

**@ There is a recess projecting upwards from its capsule, called Recessus Sacciformis.**

**@ Movements:** Pronation & supination ??





# Radio-ulnar joint diseases

1) The **proximal radioulnar joint** communicates with the elbow joint, whereas the **distal radioulnar joint** does not communicate with the wrist joint.

• **In practical terms, this means that infection of the elbow joint invariably involves the proximal radioulnar joint.**

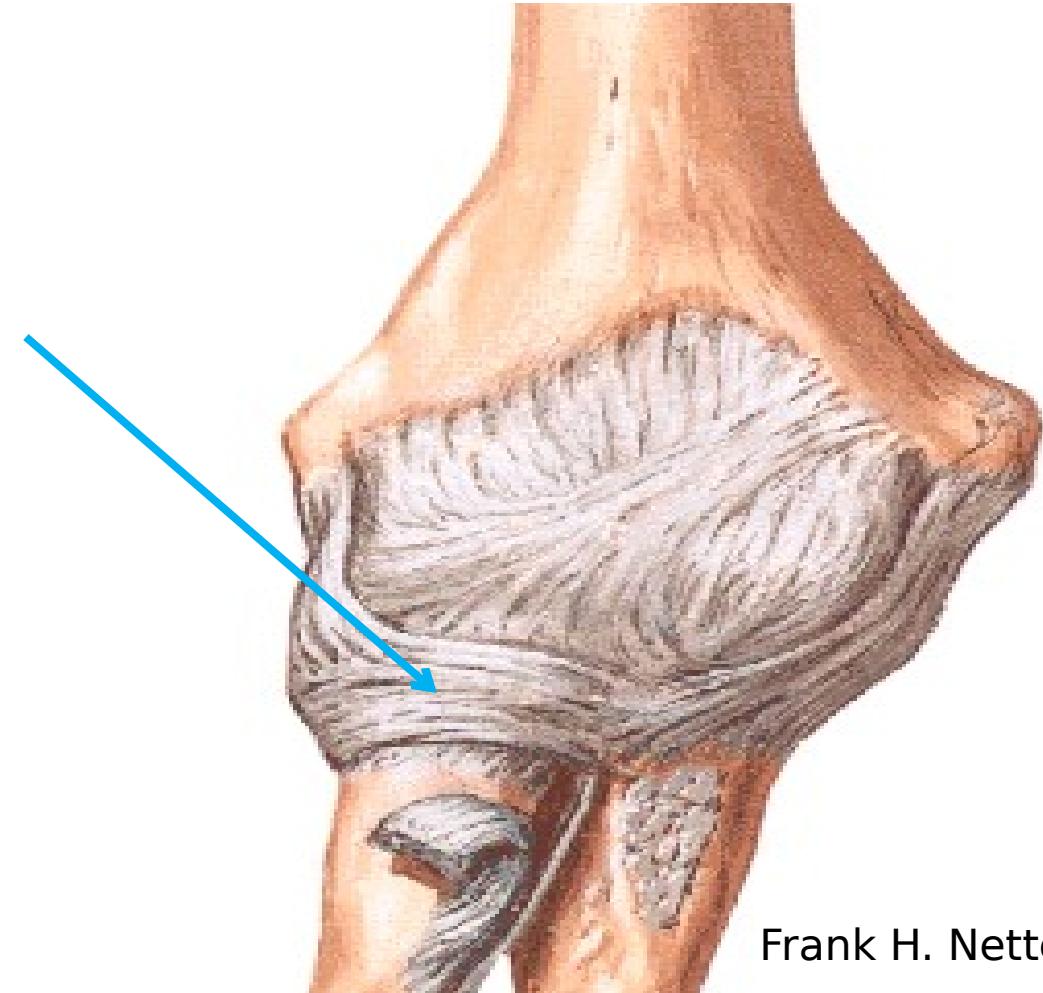


Frank H. Netter, 4<sup>th</sup> ed.



## Radio-ulnar joint diseases

2) The strength of the proximal radioulnar joint depends on the integrity of the strong **annular ligament** which can be ruptured in young children, in whom the head of the radius is still small and undeveloped.



Frank H. Netter, 4<sup>th</sup> ed.

# *Pronation & Supination*

**Axis connects  
head of radius  
with head of  
ulna**

**Supination**

**R // U**

**Radius**

**Stronger**

**From head  
to radius  
till head of  
ulna**

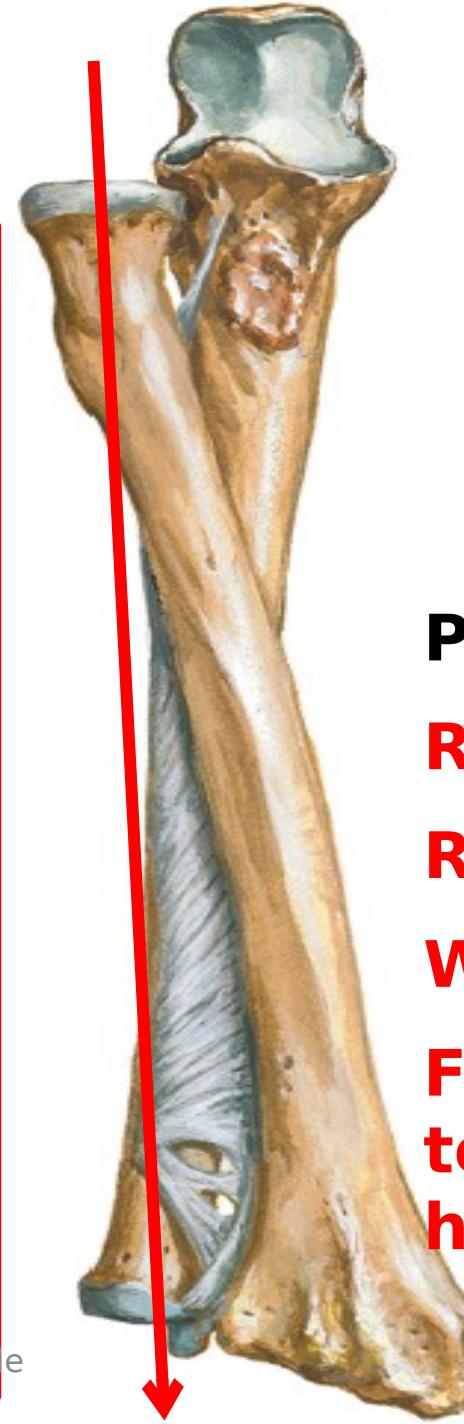


**Axis of  
pronation &  
supination**

**Questions:**

- 1) What is  
relation of  
ulna to  
radius?**
- 2) Which bone  
moves? Is it  
important?**
- 3) Which  
movement is  
stronger?**
- 4) What is the  
axis of both  
movements?**

Frank H. Netter, 4<sup>th</sup> ed.



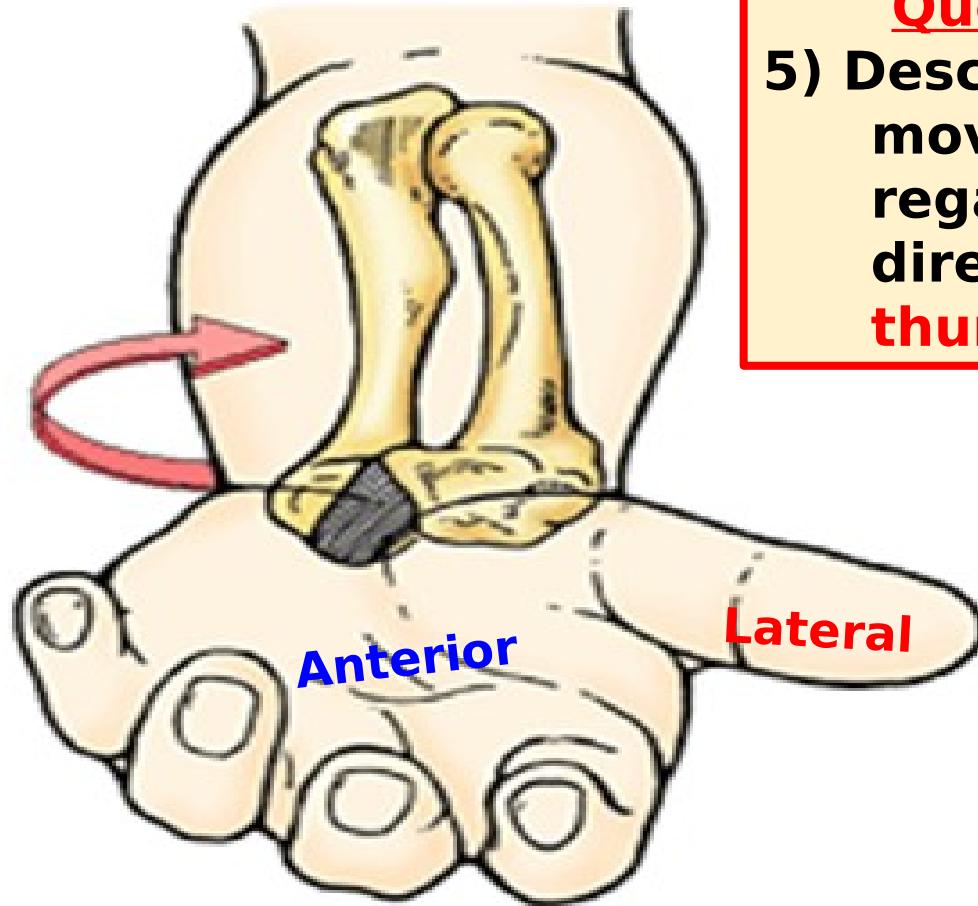
**Pronation**

**R X U**

**Radius**

**Weaker**

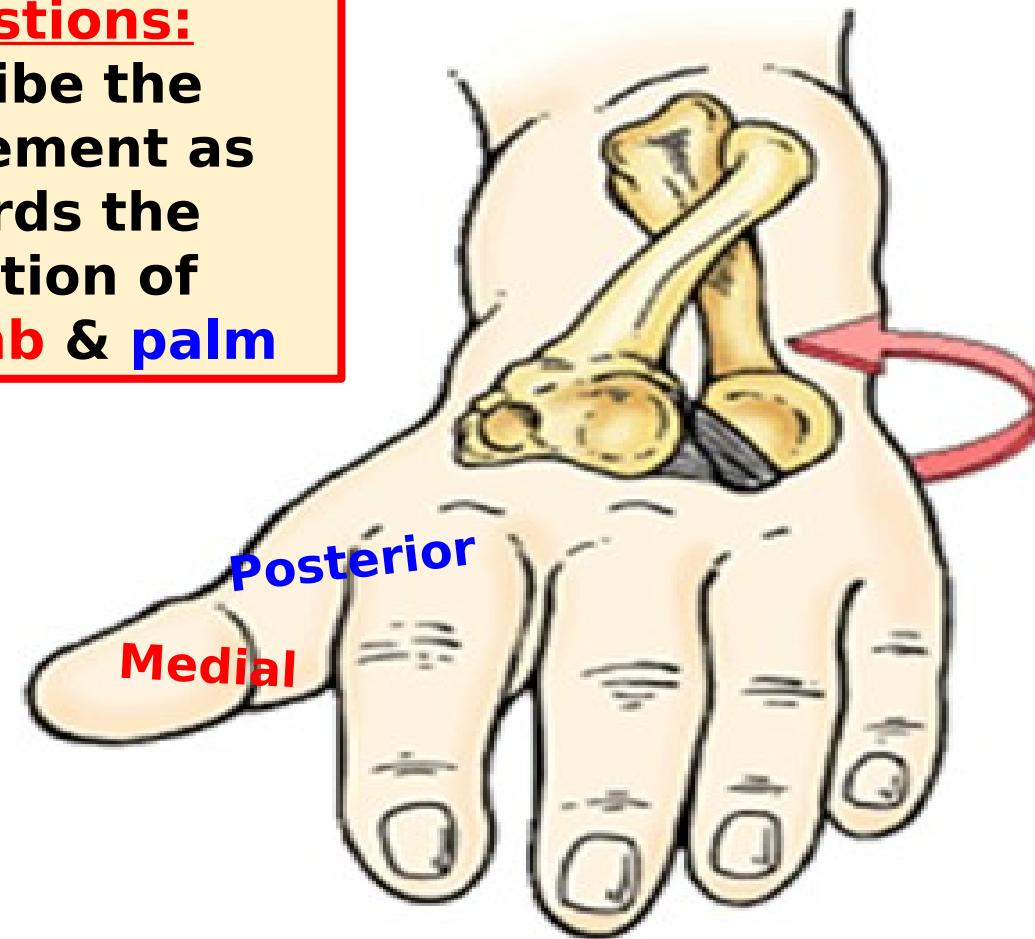
**From head  
to radius till  
head of ulna**



**Supination**  
**Beggars**

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**Questions:**  
5) Describe the movement as regards the direction of thumb & palm



**Pronation**

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# Lecture Quiz



**Which of the following structures is responsible for preventing dislocation of the superior radio-ulnar joint?**

- A. Brachioradialis muscle.**
- B. Radial collateral ligament of elbow.**
- C. Recessus sacciformis.**
- D. Quadrate ligament.**
- E. Annular ligament.**

# Lecture Quiz Answer



**Which of the following structures is responsible for preventing dislocation of the superior radio-ulnar joint?**

- A. Brachioradialis muscle.**
- B. Radial collateral ligament of elbow.**
- C. Recessus sacciformis.**
- D. Quadrate ligament.**
- E. Annular ligament.**



## SUGGESTED TEXTBOOKS

Snell Clinical Anatomy by regions 9<sup>th</sup> edition, p. 408- 410  
& figure 9.74 in page 410.

# THANK YOU

